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Soil Survey

of

The Gooding Area, Idaho

By

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United States Department of Agriculture, in Charge

and

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Bureau of Chemistry and Soils

In cooperation with the
University of Idaho, College of Agriculture
and Agricultural Experiment Station

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SOIL SURVEY OF THE GOODING AREA, IDAHO

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AREA SURVEYED

The Gooding area is in the central part of southern Idaho, about 100 miles southeast of Boise. (Fig. 1.) It comprises somewhat more than one-half of Gooding County (the southern end) and a few square miles in the southeastern corner of Elmore County. Its boundaries were so drawn as to include the greater part of the agricultural land of Gooding County and the adjoining part of Elmore County lying within the segregation of the Twin Falls Northside Canal Co. The area is bounded on the south and southwest by Snake River which separates it from the previously surveyed Twin Falls area.[1] On the east it adjoins the Jerome area [2] which was surveyed in 1927. The Gooding area includes 434 square miles, or 277,760 acres.

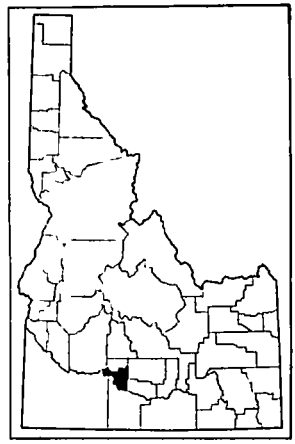

FIGURE 1.—Sketch map showing location of the Gooding area, Idaho

The Gooding area constitutes a part of that great intermountain valley known as the Snake River Plains.[3] Most of the area consists of an upland plain. To the north of this plain, mainly outside the area surveyed, lies a rather rough and deeply dissected foothill region which comprises a spur of the Sawtooth Mountain uplift. Along the south and southwest border of the area, Snake River has intrenched itself deeply in the lava and old lake-laid deposits, which form vertical cliffs or steep bluffs several hundred feet high on each side of the river. Throughout much of its length this valley, or canyon, is narrow, and there is only a narrow steep talus slope between the foot of the cliff and the river; but in the Hagerman Valley, in the Swiss Valley, and at Clear Lake and Niagara Springs, the cliffs recede from the river, leaving rather large areas of terrace lands which range from fairly smooth to steep and deeply dissected.

The relief of the upland plain ranges from smooth to somewhat rough. The comparatively thin soil mantle overlies very uneven ridgy or wavy beds of basalt (lava) rock, which lend their character

[1] BALDWIN, M., and YOUNGS, F. O. SOIL SURVEY OF THE TWIN FALLS AREA, IDAHO. U. S. Dept. Agr., Bur. Soils, Field Oper. 1921, Rpt. 23: 1367–1394, illus. 1925.

[2] POULSON, E. N., and THOMPSON, J. A. SOIL SURVEY OF THE JEROME AREA, IDAHO. U. S. Dept. Agr., Bur. Chem. and Soils Ser. 1927, Rpt. 16, 22 p., illus. 1931.

[3] RUSSELL, I. C. GEOLOGY AND WATER RESOURCES OF THE SNAKE RIVER PLAINS OF IDAHO. U. S. Geol. Survey Bul. 199, 192 p., illus. 1902.

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to the surface of the plain. (Pl. 1, A.) A very large proportion of the area mapped consists of these rough lava beds with little or no soil covering, except in the hollows, and without sufficient cover of soil to be classified as agricultural land. Such bodies have been classed as scab land. (Pl. 1, B.)

Much of this upland has no definite system of surface drainage and contains many depressions. However, this has not generally given rise to poor drainage, as the underlying beds of basalt are fissured and porous, and in no place has a high water table been formed under irrigation. In some places well-defined drainage channels lose themselves in the rough lava beds, and underground outlets dispose of the drainage water. Big Wood and Little Wood Rivers have cut channels into the plains, which in places form deep narrow canyons or gorges with vertical walls of basalt rock. A number of spring-fed streams have also cut deep side canyons or alcoves along the edge of Snake River Canyon. In the country surrounding Gooding, shallow drainage channels afford fairly thorough surface drainage into Big Wood and Little Wood Rivers. In the northwestern part of the area, Clover Creek and a number of small intermittent drainage channels have cut deeply into the softer old alluvial and lake-laid sediments which occur in this locality, forming rather narrow V-shaped valleys separating upland benches of variable extent. The same configuration occurs along Dry Creek northwest of Gooding.

A few hills or buttes rise above the upland plain. The largest of these is Gooding Butte which rises a few hundred feet above the general level of the surrounding country and covers an area of nearly 4 square miles. Its west slope is mostly gentle, but the slopes to the south, east, and north are rather steep and badly dissected, as are small areas on the western slope. On the south edge of the town of Bliss and to the northwest of that town are a number of isolated low ridgelike hills which rise from a comparatively level lava-floored plain and apparently constitute remnants of an older alluvial formation.

In the Hagerman Valley, spring-fed streams have cut deep well-defined channels, but in a few places natural obstructions have caused small lakes and marshy areas to form.

The elevation at Gooding, which is representative of much of the upland plain, is 3,572 feet above sea level; Gooding Butte is a few hundred feet higher; at Bliss the altitude is 3,259 feet; and at the lowest point in the area, where Snake River leaves at the northwest, the elevation is approximately 2,500 feet. Snake River has a fall of about 500 feet within the area, and Big Wood and Little Wood Rivers have a total fall of more than 1,000 feet. There are numerous low waterfalls and rapids in these streams. Hydroelectric power is generated at Lower Salmon Falls, at the mouth of Big Wood River, and at Thousand Springs. Thousand Springs is but one of the many enormous springs which gush from the canyon walls, giving rise to large streams like Billinger Creek, Clear Lake Creek, and the greater part of the water in the lower Big Wood River.

Gooding County was organized in 1913 from a part of Lincoln County, and in 1919 the southeastern part of Gooding County was taken to form part of Jerome County. The earliest settlements in this region were made in the decade from 1870 to 1880.

The 1930 census [4] gives a total population of 7,580, or 10.2 persons to the square mile, in Gooding County. Settlement is concentrated on the agricultural lands of the southern half of the county, which comprise most of the land included in the area surveyed. Only a small rural population is contained in that part of Elmore County included. The census classifies the entire population as rural, as there are no towns of more than 2,500 inhabitants; but there are a number of small towns in the area. Gooding, the county seat of Gooding County and a trading and shipping point of some importance, has a population of 1,592; Wendell, another local trading and shipping point, has 725; and Hagerman has 327. Bliss and Tuttle are small trading centers.

This area is served by the main line of the Oregon Short Line Railroad (Union Pacific system) and the Rupert-Bliss cut-off of the Oregon Short Line. Fairly good country roads cover the agricultural districts, and the main highways are surfaced with gravel or oiled gravel.

Telephone service and electric power and light are available in the towns and over much of the farming country. Good centralized graded schools and high schools are maintained in the towns and good graded schools in the rural districts.

CLIMATE

The climate of the Snake River Plains of southern Idaho, in which the Gooding area is situated, is characterized by a low annual rainfall, a dry atmosphere, a large proportion of sunny days, hot summers, and cold winters. Temperature changes occur suddenly, and the daily range of temperature is often great. The dry heat of the summers is usually not oppressive and the winters are frequently rather open, though a rather heavy snowfall occurs during some winters. Strong winds are common, especially in the spring and early summer, and dust and sand storms are not infrequent. The prevailing winds are from the west and southwest.

The average annual precipitation of 9.84 inches comes largely in the fall, winter, and spring months. The summers are usually very dry, making it possible to cure hay and seed crops with little danger of damage by rain. Dry farming has never been successful, and at present farming is carried on entirely under irrigation.

Table 1 gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at the United States Weather Bureau station at Gooding.

The frost-free season at Gooding averages 119 days, from May 22 to September 18, inclusive. Late spring frosts occasionally do much damage to fruit, beans, and tender vegetables.

Those localities, as Hagerman Valley, which lie at the lower elevations along Snake River, are warmer and have a longer growing season than do most of the upland bench lands. Here are grown watermelons, cantaloupes, peaches, apricots, sweet cherries, and certain varieties of corn which can not be grown with so great an assurance of success on the higher lands.

[4] Soil survey reports are dated as of the year in which the field work was completed Later census figures are given whenever possible.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Gooding, Idaho*

[Elevation, 3,572 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1914)	Total amount for the wettest year (1927)	Snow, average depth
	°F.	°F	°F	Inches	Inches	Inches	Inches
December	26 1	60	−22	0 98	0 26	0 99	5.1
January	23. 9	59	−22	1 18	1 18	1 31	10 6
February	28. 1	54	−14	1 16	15	3 91	6 7
Winter	26 0	60	−22	3 32	1. 59	6 21	22 4
March	38 9	76	−7	52	06	.29	1 4
April	46. 5	94	13	.95	1 02	1 04	1.5
May	54. 8	102	18	.83	.44	1 70	3
Spring	46 7	102	−7	2. 30	1 52	3 03	3 2
June	63. 2	103	27	51	43	.27	0
July	71 4	104	31	40	.22	(1)	.0
August	68 7	104	30	25	00	04	.0
Summer	67 8	104	27	1 16	.65	31	0
September	58 3	96	21	52	1 09	77	0
October	47. 8	91	13	97	1. 74	1 39	2
November	36 7	71	−8	1 57	02	2. 54	1 7
Fall	47 6	96	−8	3 06	2 85	4. 70	1 9
Year	47 0	104	−22	9 84	6 61	14 25	27 5

[1] Trace

AGRICULTURE

The Gooding area was, originally, and large parts of it still are, a sagebrush desert. Sagebrush, or black sage (*Artemisia tridentata*), forms the characteristic natural vegetation of most of this country, and rabbit brush is common on the sandier soils. Small, fine-leaved annual grasses and flowering herbs grow rather plentifully in the spring, but they dry up with the coming of summer.

Between 1870 and 1880 the earliest settlers in this area settled along Little Wood River in the neighborhood of Toponis, later called Gooding, in the Hagerman Valley, and in a number of places along Snake River. Many of these settlers were cattle and sheep men who grew alfalfa hay to supplement the pasturage provided by the open range of the adjacent plains and mountains. Most of the earlier settlers in the Hagerman Valley were placer miners who washed the sand and gravel deposits along Snake River and took up homestead lands which they farmed when the mining operations failed to make good returns. Many of the people who settled in this part of the area were Mormons, and, like people of their faith elsewhere in the West, they developed small tracts of land intensively, growing fruits and vegetables for their own or local consumption and practicing dairying and sheep and poultry raising on a small scale. Alfalfa was from the beginning, and still is, the most important crop grown in the area.

The greater development of this section of the country dates from the opening of the large irrigation projects. The Twin Falls North-

side Canal Co. project, completed in 1907, has an area of about 185,000 acres, of which 126,006 acres were in crops during 1929. Of this cultivated acreage, roughly two-fifths lies within the Gooding area, and the rest is in Jerome County. The Big Wood River Canal Co. project was first watered in 1910. Of this project, 21,430 acres of cultivated land lie in Gooding County.

With the inception of these projects the land was settled rapidly, cleared, and put under cultivation, and there was a steady growth until 1920 or 1921. With the advent of the agricultural depression, a slight slump in agricultural activities took place in this area, but in the last three years the acreage under cultivation has again begun to expand slowly, and the peak was reached in 1929. It is probable that the land actually under cultivation in the area totaled about 80,000 acres in that year.[5] Most of the more desirable land has been developed, but a comparatively small acreage may yet be brought under cultivation. Most of the remaining land in the projects is too sandy, shallow, or stony to be desirable, and some of it is too rolling for efficient irrigation.

Alfalfa, which ranks as the most important crop in the area, occupied a total acreage somewhat in excess of 35,000 acres in 1929. The greater part of this was devoted to the production of hay. Three cuttings of hay are commonly made each year. This crop produces, according to farmers' estimates, from 1 to 6 tons, with an average of 3 tons or slightly less. Yields on the Big Wood Canal Co. project were seriously cut by lack of water in 1929. Probably about 3,000 acres of the alfalfa land was devoted to seed production in 1929. The yield of alfalfa seed varies greatly from year to year and from farm to farm. Total failures are experienced occasionally and yields as high as 20 bushels or more an acre are reported. The average seems to be about 6 bushels. Some farmers take a light cutting of hay from the land early in the season and then let the plants go to seed. Grimm is the principal variety of alfalfa grown for seed, as the demand for seed of this variety is good and the price is generally high. The straw, after the seed is harvested, is said to be worth about one-third as much as alfalfa hay for livestock feeding.

Alfalfa is a valuable crop not only for the hay and seed it produces but also for maintaining or increasing the productivity of the soil. (Pl. 2, B.) It is commonly grown in rotation with wheat or barley, corn, potatoes, and beans. Most other crops give decidedly better yields for at least two years after alfalfa. Practically all the hay is fed on the farms to farm cattle, sheep, or work animals or to range sheep and cattle brought into the valley for winter feeding. This practice furnishes a market for the hay and keeps its fertilizing elements on the farms.

Alfalfa produces good crops of hay on all the soils of the area but is particularly valuable on the sandier soils, as these give good yields of hay and seed and are not so well adapted to the growth of most other farm crops. Its fertilizing effect is especially important on these sandier soils.

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[5] The figures concerning land now (1929) under cultivation were obtained from crop reports of the canal companies, supplemented by estimates by their officials. Estimates of the range of crop yields and average yields are based on reports of actual yields and estimates of range of yields given by a large number of farmers.

A problem, which deserves careful study, has recently arisen in connection with alfalfa growing. According to the reports of a great number of farmers, alfalfa yields have recently been dwindling on lands that have been devoted to alfalfa for many years. Many of the farmers believe that the fertility of the soil is becoming exhausted. They say that on land which once produced 5 tons an acre, 3 tons or less are now being obtained, even after the old fields are plowed and reseeded. This contention seems to have some weight, especially when applications of manure bring yields up to the old normal level. However, on studying the chemical composition of the soils in this area, it would seem that they contain an abundance of mineral plant food, especially lime and potash. An alfalfa-wilt disease is doubtless responsible for a part of the trouble. It is present in much of the older cultivated country of Hagerman Valley and is also reported to be bad in the vicinity of Tuttle. Other unknown diseases may also be present. Careful fertilizer tests may show whether or not the trouble is due to the exhaustion of available plant food. In many of the highly calcareous or alkaline western soils the phosphorus in the soil is rendered largely unavailable by their alkaline condition. In Arizona and Nevada applications of superphosphate have resulted in large increases in yields of alfalfa.

The wheat acreage varies greatly from year to year, depending largely on the prices received the previous season. This crop probably occupied 15,000 acres or somewhat more in 1929. Yields reported range from 5 to 65 bushels an acre; the average is probably between 25 and 30 bushels. Dicklow and Federation, soft spring wheats, are the two important varieties grown. Wheat produces better yields on soils of medium or fine texture, although it is grown on the sandier soils to some extent.

Barley was grown on about 5,000 acres in 1929. Yields ranging from 20 to 75 bushels an acre were reported, with an average of about 35 bushels.

In the same year probably 6,000 acres or more were devoted to tame pasture besides the areas in alfalfa, clover, and grain, which were pastured after removal of the crops. Bluegrass is the most common pasture grass. White and Ladino clovers are also popular, and alfalfa, sweetclover, alsike, red clover, orchard grass, and other grasses are often used in pasture-grass mixtures. Sweetclover alone is occasionally used for pasture. Sedges, salt grass, and marsh grasses form much of the pasturage on the small areas of low, wet lands in the Hagerman Valley.

Beans were a crop of negligible importance until the last three years (1927, 1928, and 1929), since the stabilization of the water supply. In 1929 a rough estimate put the total acreage at 5,000 acres. Yields reported range from nothing to 40 bushels an acre. The average is probably between 15 and 20 bushels. This has proved to be a productive and profitable crop over a period of about 20 years in the adjoining Twin Falls area where tens of thousands of acres are in beans, and some very good crops have been produced. The finer-textured soils of the Jerome and Gooding areas are suited to bean production, but beans do not yield so satisfactorily on the sandier soils. The variety most commonly grown is the Great Northern. Extension of the bean acreage may be expected on the Gooding,

Portneuf, and Goose Creek soils around Gooding when the new Gooding Canal is finished.

Potatoes have attained greater importance in the last few years, since a better water supply has become available. The acreage devoted to this crop in 1929 was probably about 1,500 acres. In 1927 and 1928 it was probably about 30 per cent higher, but unsatisfactory prices curtailed the acreage planted in 1929. Yields ranged from 100 to 300 sacks (110 pounds each) to the acre. Potatoes are grown most extensively on, and seem well adapted to, Portneuf fine sandy loam, Portneuf loamy fine sand, and Portneuf loam. The quality of potatoes grown in this area, as well as in other sections of southern Idaho, is high. The tubers are large, smooth, and clean. Idaho potatoes are widely advertised and have an enviable reputation. They are shipped to all parts of the United States. The most important varieties are the Netted Gem (Idaho Russet or Russet Burbank) and Idaho Rural. Potato prices vary greatly from year to year. In some years they are so low as to cause financial loss to the grower; in other years they may net as high as $500 an acre.

About 3,000 acres within the Gooding area were devoted to red clover in 1929. Of this, about two-thirds was devoted to the production of seed and the rest to hay production. Some farmers make a cutting of hay before letting the crop go to seed. This hay crop averages about 1 ton to the acre. The clover straw, after threshing, is of some value as feed for livestock. Clover seed produces from 2 to 13 bushels an acre, with an average of 6 or 7 bushels. When cut for hay this crop produces an average between 2 and 3 tons an acre.

Corn is increasing in importance. The acreage in 1929 was nearly 2,000 acres. Yields ranging from 20 to 100 bushels were reported by farmers, with an average of probably about 35 bushels. An early maturing strain of yellow dent corn is most commonly grown for grain. A rather large acreage is devoted to silage corn. Larger, later-maturing varieties are used for this purpose. Yields of silage range from 8 to 20 tons.

Alsike, white, and Ladino clover seed are cash crops of some importance, occupying a few hundred acres. Alsike produced an average of about 8 or 9 bushels of seed an acre; white and Ladino clovers produce somewhat less.

Orchards occupy a total of nearly 1,000 acres within the area. Yields of orchard fruits are extremely variable, as many of the orchards receive little attention in the way of spraying and pruning. Many of the orchards are small, and the fruit is used at home. However, there are a number of small commercial orchards that are well cared for and produce excellent crops of high-grade fruit which is shipped to eastern markets, sold in the near-by towns, or sold from roadside stands to tourists and local people.

Apples constitute the most important fruit crop. The leading varieties are Jonathan and Delicious, with a smaller proportion of King David, Winesap, Gano, Rome Beauty, Grimes Golden, and a number of other varieties. Sweet and sour cherries, apricots, and peaches are crops of some importance, especially on the ranches along Snake River. Pears, plums, prunes, and grapes also produce good fruit in that locality.

Fruit growing was at one time (about 1910–1912) thought to have much promise in this area and a rather large acreage was planted

to orchards which have later been pulled up or abandoned. On one ranch, known as the Swiss Valley ranch, many hundreds of acres were set to prunes, apples, peaches, and sweet cherries. The ranch has been abandoned, and most of the trees are dead from lack of water. Poor marketing conditions, with low prices and high freight rates, years of insufficient water supply, and frost injury to fruit crops have combined to make fruit growing unprofitable. The frost injury is seldom serious in some parts of the area, notably in the Hagerman Valley and at Niagara Springs.

Oats are of minor importance, although they yield somewhat more heavily than wheat or barley. Probably between 1,000 and 1,500 acres were in oats in 1929.

A small acreage was in sugar beets in 1929, with yields ranging from poor to good. Curly-top disease cut the yield in a number of places.

Small areas are devoted to gardens, stock beets, rye, onions, peas, carrots, and miscellaneous crops.

Livestock raising and feeding constitute an important industry in the Gooding area. Range cattle and sheep are fed on the ranches during the winter. Farm herds and flocks are becoming increasingly important. Many carloads of lambs are shipped annually to eastern or west-coast markets. Dairying is practiced to a rather large extent and is becoming more important. Local creameries and cheese factories take part of the milk, and a number of cream-shipping stations gather cream for shipment to creameries in cities outside the area. A small quantity of market milk is sold locally. Hogs and poultry, especially turkeys, are raised on many farms. The turkeys are shipped largely to eastern and west-coast markets.

SOILS AND CROPS

The soils of the Gooding area vary a great deal within short distances, and a single farm is, in general, made up of several different soils. It can not be said that there is any one great prevailing type of soil as is true in the adjoining Twin Falls area. In fact there are rather large total acreages of several soils but not many large unbroken bodies of a single soil. A study was made of the relative importance of the various crops grown on the different soils and the yields obtained. This study was greatly hampered by the fact that that part of the area surrounding Gooding and irrigated by the Big Wood River Canal Co. system has been short of irrigation water during many seasons since the establishment of that company in 1910. The shortage was especially serious during the present season (1929). In spite of these difficulties certain observations were made and conclusions drawn as to the adaptation of the various soils to the crops of the area.

The soils of this area are rich in lime, potash, phosphorus, and other mineral plant foods, but comparatively poor in nitrogen. Since this is true of all the important soils of the area, it is apparent that soil texture, which is determined by the relative proportion of soil particles of the various sizes, and other physical features of the soils are the most important soil characteristics in determining the degree of success with different crops. The nitrogen supply may be obtained through the growth of legume crops, thus maintaining also

a good content of organic matter in the soils. Another important factor to be considered is the depth of the soil mantle over the underlying bedrock or hardpan. Both soil texture and soil depth have a definite bearing on the maintenance of favorable soil moisture conditions and in that way have a direct relation to the handling of irrigation water and to crop production. These characteristics also govern to some extent the supply of available plant food and, therefore, the productivity of the soils. Another feature to be considered is the ease with which good stands of crops may be obtained. The sandier soils dry out more quickly at the surface and are more subject to blowing, thus rendering it more difficult to obtain good stands on these than on the finer-textured soils.

The soils of the area may be considered as belonging to two general groups as follows: The medium-textured soils and the light, or coarse-textured ones. The medium-textured soils occupy a somewhat greater area, but the light-textured soils are also extensive. The soils considered as medium textured include sandy loams, fine sandy loams, loamy fine sands, very fine sandy loams, loams, silt loams, and small bodies of silty clay loams; under the light-textured soils we have fine sands, loamy sands, and some of the sandy loam areas with very loose subsoils.

Further division may be made on the thickness of the layer of soil material. In general, where most of the land is underlain by bedrock or firmly cemented lime hardpan within 3 or 4 feet of the surface, the soils are considered shallow. However, on account of the extremely uneven surface of the bedrock, the soils vary greatly in depth, and consistent mapping is difficult. The depth may vary from no soil at all (or actual rock outcrop) to a depth of more than 6 feet within a very short distance.

In the following pages of this report the different soils of the Gooding area are described in detail, and their agricultural importance is discussed; the accompanying soil map shows their distribution; and Table 2 gives their acreage and proportionate extent.

TABLE 2.—*Acreage and proportionate extent of the soils mapped in the Gooding area, Idaho*

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Portneuf fine sandy loam	10,368	3.7	Goose Creek silty clay loam	1,344	0.5
Portneuf fine sandy loam, shallow phase	15,488	5.6	Goose Creek silty clay loam, heavy-subsoil phase	1,344	.5
Portneuf fine sandy loam, steep phase	512	.2	Goose Creek fine sandy loam	3,712	1.3
Portneuf fine sandy loam, terrace phase	2,560	.9	Goose Creek fine sandy loam, dark-colored phase	448	.2
Portneuf fine sandy loam, alluvial phase	1,856	.7	Portneuf fine sand	9,280	3.3
Portneuf very fine sandy loam	2,368	.9	Portneuf fine sand, shallow phase	19,264	6.9
Portneuf loam	1,984	.7	Gooding sand	5,824	2.1
Portneuf loamy fine sand	6,656	2.4	Winchester fine sand	3,392	1.2
Portneuf loamy fine sand, shallow phase	11,136	4.0	Ephrata loamy sand	3,584	1.3
Gooding silt loam	8,384	3.0	Ephrata loamy sand, poorly drained phase	320	.1
Gooding silt loam, deep phase	2,176	.8	Ephrata loamy sand, stony phase	5,312	1.9
Gooding silt loam, stony phase	8,192	3.0	Ephrata sandy loam	3,584	1.3
Gooding loam	3,136	1.1	Ephrata sandy loam, noncalcareous-subsoil phase	384	.1
Gooding sandy loam	3,072	1.1	Scab land	119,424	43.0
Minidoka loamy fine sand	7,424	2.7	Rough broken land	7,616	2.8
McCammon sandy loam	576	.2	Rough stony land	6,336	2.3
Sagemoor silty clay loam	384	.1	Total	277,760	
Sagemoor silty clay loam, light-textured phase	320	.1			

MEDIUM-TEXTURED SOILS

The medium-textured soils are, as a rule, well adapted to all the common crops of the area. One exception may be noted—the alfalfa-seed crop, which is generally more successful on the sandier soils although on some of the fine and very fine sandy loams with open subsoils this crop also does well. The most important crops on this class of soils in order of their importance are alfalfa hay, wheat, beans, tame pasture grasses, barley, potatoes, corn, clover seed, and clover hay. Alfalfa seed, sugar beets, oats, and tree fruits, especially apples, also have some importance.

The soils of the Gooding series have heavier-textured, tougher subsoils than those of the Portneuf series. The Gooding subsoil absorbs water rather slowly but when once wet holds moisture very well. It doubtless offers some resistance to, but does not stop, root development and penetration. In most places the deep-rooted alfalfa and clover plants do well and give satisfactory yields in years when sufficient water is available. However, in a few small spots, where the subsoil is unusually tough and has little or no coating of surface soil, alfalfa plants are stunted. Spots of this sort are locally called "slick spots" or "white spots." The trouble is probably owing to the fact that the subsoil does not absorb moisture readily enough and that it is not readily penetrated by roots and by air. Deep plowing and turning under of manure are advised to ameliorate this condition.

Portneuf fine sandy loam.—Portneuf fine sandy loam is the most important of the medium-textured soils and probably the most important agricultural soil in the Gooding area at this time. It covers an area of 10,368 acres, constituting 3.7 per cent of the total surveyed area, and lies largely in the neighborhood of Wendell, especially to the southeast of that town.

The surface soil is light brown or light grayish brown, is mellow, and is easily worked. The subsoil, below a depth of about 8 inches, is generally lighter, or grayer, in color than the surface soil and contains a high percentage of lime carbonate. At a depth averaging about 18 inches is a rather compact or tough limy layer, called "hardpan" by many farmers. It can not be considered a true hardpan as it is not sufficiently cemented. This layer, which usually extends to a depth of 2½ or 3 feet below the surface, is generally very noticeable in a dry soil but softens readily when water is applied. It doubtless offers some resistance to the development and penetration of plant roots but seemingly has no harmful effect on crop growth. Alfalfa roots penetrate it readily. Below the compact layer, soft fine-textured material is present in most places, but where the bedrock approaches within 6 feet of the surface there is, in many places a more or less firmly cemented lime hardpan overlying the rock. Small shallow spots and rock outcrops occur here and there within this soil as mapped.

On the whole this is a fairly deep soil of favorable texture, which holds moisture well and contains an abundance of the mineral plant foods. Although it does not contain a large quantity of nitrogen and humus, it is richer in these constituents than are the sandier soils.

This soil is very largely under cultivation and produces good yields of most of the important crops of the area. Alfalfa grown for hay is the most important crop and probably occupies between 30 and 40 per cent of the total area of the soil. It produces from 1½ to 6½ tons to the acre with an average of about 4 tons where the water supply is not cut short. Low yields reported on small areas of this soil in the vicinity of Gooding are owing largely to lack of water. Alfalfa seed, though not a very important crop on this soil, is grown to some extent, and yields ranging from 4 to 7 bushels an acre are reported. Wheat is an important crop, occupying an acreage which probably ranges from 10 to 50 per cent of the whole soil in different years. It is reported to yield from 15 to 65 bushels an acre, with an average between 35 and 40 bushels when given sufficient water. Barley yields are reported as ranging from 30 to 80 bushels an acre, with an average of 40 or 45 bushels. Beans are an important crop, and the yield varies greatly. A few failures were reported, and 40 bushels an acre were produced in some fields. The average is probably about 20 bushels an acre on this soil. Corn produces from 30 to 100 bushels, with about a 40-bushel average, and corn silage yields from 10 to 20 tons an acre. The yield of clover seed ranges from 3 to 10 bushels or sometimes more. Potatoes yield very well, estimates giving from 100 to 300 sacks (110 pounds each) to the acre as the range of yields. Clover hay and oats yield well, but they are crops of minor importance. A number of small commercial orchards on this soil are producing good yields of high-quality apples, and a smaller number of cherry, pear, and apricot trees are giving good returns. Sugar beets are grown on a very small acreage, and yields range from poor to good.

Portneuf fine sandy loam, shallow phase.—The shallow phase of Portneuf fine sandy loam is also extensive, occupying 15,488 acres, or 5.6 per cent of the entire area. It is very similar to the typical soil but has a thinner layer of soil material overlying the rock or the layer of firmly cemented lime hardpan which caps the rock. The greater part of this soil is less than 4 feet thick and much is not more than 2 or 3 feet thick. Shallower and deeper spots occur, and rock outcrops are numerous.

In the soil survey of the adjoining Jerome area this material was designated Portneuf fine sandy loam, rock-outcrop phase.

Crop yields obtained on this soil are somewhat lower than on the deeper Portneuf fine sandy loam. The shallower soil dries out more rapidly, especially in the extremely shallow spots, and it requires more frequent irrigation.

Portneuf fine sandy loam, steep phase.—The steep phase of Portneuf fine sandy loam occurs on rather steep slopes, many of which are badly gullied, and most of which lie about the foot of Gooding Butte. The soil ranges from shallow to fairly deep, but the surface is too steep or rough to be cultivated. The land is at present of little use except for the scant grazing it affords, though it might prove well adapted to the growing of tree fruits where water is available. Much of it lies above any present source of water supply.

Portneuf fine sandy loam, terrace phase.—The terrace phase of Portneuf fine sandy loam is not extensive. It occurs on the terraces

of Snake River in Hagerman Valley and near Thousand Springs, Clear Lake, and Niagara Springs. It is very similar to typical Portneuf fine sandy loam, but instead of lying over a substratum of basalt lava it overlies stratified sedimentary deposits, in most places loose gravel, though here and there fine silts or clays of lake-laid origin occur. Most of the land is well drained and free from alkali, but a few low-lying areas near the river are poorly drained and are somewhat affected by concentration of alkali salts.

This soil produces alfalfa hay, wheat, barley, corn, and pasture, and supports a few small orchards. Where well-drained its crop-producing value is about equal to that of typical Portneuf fine sandy loam.

Portneuf fine sandy loam, alluvial phase.—Portneuf fine sandy loam, alluvial phase, has a light-brown or light grayish-brown fine sandy loam or loam surface soil overlying a deep friable subsoil which is of much the same character as the surface soil, though in most places somewhat grayer and more limy. A small area of this soil lying just south of Hagerman is heavy loam or clay loam in texture. Drainage is generally good. Although this is not an extensive soil, it constitutes very good land and is nearly all under cultivation. It produces good crops of alfalfa hay, wheat, barley, potatoes, and corn.

Portneuf very fine sandy loam.—Portneuf very fine sandy loam is not so extensive a soil as Portneuf fine sandy loam. It is very similar to Portneuf fine sandy loam but is slightly finer in texture and probably averages somewhat deeper. It is nearly all under cultivation, and, like the fine sandy loam, is suitable to all the common crops of the area. This is perhaps a slightly better soil for the production of small grains and beans.

Portneuf loam.—Portneuf loam occurs largely in a single body south of Gooding. It is much like Portneuf fine sandy loam and Portneuf very fine sandy loam but is of slightly heavier texture in both surface soil and subsoil than are those soils, and it requires somewhat more power for plowing and cultivation. Most of it is deep, reasonably mellow, and pervious, and a very good general-crop producer. It probably will, when supplied with sufficient water, produce yields of alfalfa hay, potatoes (pl. 2, A), and corn about equal to those obtained on Portneuf fine sandy loam. It will probably be even better adapted to the production of small grains and beans than is the fine sandy loam. Yields of 60 bushels of wheat and 70 bushels of barley have been obtained on this soil in years when sufficient water was available. Red and white clover seed yield well.

Portneuf loamy fine sand.—Portneuf loamy fine sand is very similar to Portneuf fine sandy loam, but it has a somewhat lighter and looser surface soil. The subsoil may or may not be somewhat lighter and looser than in the fine sandy loam. The water-holding capacity of this soil is generally slightly lower than in the fine sandy loam, and the surface soil is more subject to blowing. In general, it is adapted to the same crops as are grown on the fine sandy loam. It commonly gives somewhat poorer results with wheat, barley, oats, and beans but is a good producer of alfalfa hay and seed, potatoes, corn, and clover seed.

Portneuf loamy fine sand, shallow phase.—The shallow phase of Portneuf loamy fine sand dries out more quickly than the deeper

soil and has a more limited zone for root penetration. Rock outcrops are rather numerous. The land requires more frequent irrigation, and, on the average, probably gives slightly lower yields of the crops commonly grown. Areas of this soil join with and are similar to Portneuf loamy fine sand, rock-outcrop phase, of the Jerome area.

Gooding silt loam.—Gooding silt loam, which is the most extensive soil in the Gooding series, lies to the north of Gooding. The surface soil is mellow light-brown, light grayish-brown, or light brownish-gray silt loam or very fine sandy loam to about plow depth, where it becomes distinctly heavier, and the subsoil is brown rather tough heavy silty clay loam or clay. The first 2 or 3 feet of soil do not generally contain any free lime carbonate, but below a depth of 3 feet the material is very limy, and a firmly cemented platy lime hardpan overlies the lava bedrock which occurs in most places from 2 to 6 feet below the surface. The depth of soil is extremely variable within short distances, and rock outcrops are numerous in places. So-called slick spots, already referred to, are more frequently found in this soil than in other soils of the Gooding series.

This soil occurs only in the country north of Gooding in the Big Wood River project, and the water supply, which fluctuates greatly from year to year, is unsatisfactory at the present time (1929). This renders the crop adaptation of this soil difficult to compare with that of soils of other series within the area. Alfalfa hay, which is the most important crop, yields from 1 to 1½ tons in a short-water year and from 4 to 5 tons in a good-water year. Some farmers report 6 tons as a maximum yield, but between 3 and 4 tons seems to be the average under fair moisture conditions. Wheat and other small-grain crops are also important. Wheat is reported to yield from 5 to 60 bushels an acre, with an average of about 30 bushels. Barley yields somewhat more than wheat. Red, alsike, and white clovers are grown largely for seed. According to threshers' estimates, the seed yield for 1928 averaged about 9 bushels an acre of alsike clover, about 7 bushels of red clover, and somewhat less of white clover. Alfalfa seed does not seem to set well on this soil. A rather large acreage is devoted to tame pasture, but on account of shortage of water the pastures dry up badly in summer. Beans have not been grown to a great extent, but they may prove well adapted when the water supply is improved. With a better water supply, potatoes and corn will also probably do fairly well.

Gooding silt loam, deep phase.—The deep phase of Gooding silt loam is very similar to typical Gooding silt loam, but it averages deeper to bedrock. It is largely free from rock outcrops or excessively shallow spots, and much of it is more than 6 feet deep. The surface soil averages somewhat deeper than in the typical soil, and in places the subsoil is slightly less tough. The same crops are grown, but on account of the more uniform and favorable character of this deep soil, somewhat higher yields are obtained than on most areas of the shallower soil.

Gooding silt loam, stony phase.—The stony phase of Gooding silt loam is very similar to typical Gooding silt loam but averages slightly shallower and contains a large quantity of loose rock which must be cleared from the land before it can be cultivated. In general, the land is more rolling than the typical silt loam. Much of the

typical Gooding silt loam mapped was at one time stony, but the land has been cleared for cultivation. The stony soil is not under cultivation at present, but that part of it which lies below the ditches of Big Wood River Canal Co. will doubtless be cultivated when a better water supply is obtained. The value of this stony land is somewhat less than that of typical Gooding silt loam.

Gooding loam.—Gooding loam is very much like Gooding silt loam but has a slightly coarser or grittier surface soil containing a rather large proportion of fine sand. The soil mantle is generally less than 4 feet deep over the firmly cemented lime-carbonate hardpan which caps the lava rock. Rock outcrops are not infrequent, and much loose rock was present before the land was cleared. The same crops are grown and practically the same yields are obtained as on the silt loam.

Gooding sandy loam.—Gooding sandy loam is much like the silt loam and loam members of the Gooding series, but it has a lighter surface soil which ranges from fine to medium sandy loam. The surface soil is somewhat subject to blowing and dries out more rapidly than the surface soil of the finer soils. This soil is probably somewhat better for alfalfa but less desirable for small grains than are the finer soils. Potatoes and corn should do well and beans fairly well but not so well as on the finer-textured soils.

Minidoka loamy fine sand.—Minidoka loamy fine sand lies in the northwest corner of the Gooding area. It is a soil which closely resembles Portneuf loamy fine sand, shallow phase. The 6 to 12 inch surface soil is light-brown friable or rather loose loamy fine sand or fine sandy loam. Beneath this lies light-gray or white softly cemented fine sandy loam containing a very high percentage of lime carbonate, and, at a depth ranging from 1½ to 3 feet, this material grades into a firmly cemented lime hardpan. Under the hardpan is a somewhat softer grayish material, and a bed of gravel is reached at depths ranging from 3 to more than 10 feet below the surface.

Only a small part of this soil is under cultivation. It is producing fairly good yields of alfalfa hay, corn, potatoes, wheat, and barley. Its shallowness and comparatively light texture cause it to dry out quickly, thus requiring frequent irrigation. The surface soil is somewhat subject to blowing.

In spots where the gravel substratum lies closer to the surface than typical, a number of gravel pits have been opened.

McCammon sandy loam.—McCammon sandy loam is a shallow friable rust-brown or reddish-brown sandy loam overlying basalt (lava) bedrock. The depth of the soil material ranges from a mere film to 2 feet, or rarely more. The surface of the bedrock is granular and crumbly, and fine angular fragments of this material are scattered through the soil. No free lime carbonate is present in most places, though in a few deep spots a gray lime layer lies just above the bedrock.

Very little of this soil is under cultivation, and only a small proportion lies low enough for irrigation. A small acreage is producing fair yields of alfalfa, small grains, and beans. The soil is rather too droughty to be desirable and requires very frequent irrigation.

Sagemoor silty clay loam.—Sagemoor silty clay loam is a soil covering only a small area in Hagerman Valley. The surface soil

consists of fairly friable or slightly compact light-gray or light grayish-brown clay loam or silty clay loam. It extends to a depth ranging from a few inches to a foot or more and is underlain by compact light-gray silty clay or clay occurring in thin platelike layers. This material is in general very limy, in many places somewhat cemented or indurated. It doubtless offers some resistance to the penetration of plant roots and to some extent retards the percolation of water. On account of its occurrence on slopes, much of the land is well drained, but a rather large acreage, which lies just below a sandy bench east of Hagerman, receives seepage water from the higher land and is boggy. The wetter spots are somewhat affected by alkali salts and are used largely for pasture. Better-drained areas are used for alfalfa, pasture, and small grains. A number of small orchards of apples, apricots, and sweet cherries are on this land.

Sagemoor silty clay loam, light-textured phase.—The light-textured phase of Sagemoor silty clay loam has a light-brown or grayish-brown surface soil ranging in texture from sandy loam or fine sandy loam to loam. This material ranges in depth from a few inches to 2 feet and overlies the compact gray clay subsoil described in connection with the typical Sagemoor silty clay loam.

This soil is very inextensive. It is devoted largely to tame pasture, with small areas in alfalfa, wheat, and corn.

Goose Creek silty clay loam.—Goose Creek silty clay loam has a dull-brown or dark grayish-brown surface soil which appears dark gray or almost black when wet. It is somewhat sticky or plastic and has a tendency to form clods. It requires more power to plow or cultivate than do most of the soils of the area. In most places the upper part of the subsoil is similar to the surface soil, but below a depth ranging from 2 to 3 feet it is lighter in color, more mellow, and lighter in texture. In most places the soil contains little or no lime carbonate.

This is a deep, rich, pervious soil and lies admirably well for irrigation. Although not extensive, it is fairly important agriculturally. It is practically all under cultivation, except that part included in the town site of Gooding. This is an admirable garden soil, as is attested by the many fine flower and vegetable gardens growing thereon. Orchard and shade trees make an exceptionally thrifty growth. Where sufficient irrigation water is applied, good yields of alfalfa hay, clover seed and hay, wheat, barley, tame pasture grasses, corn, and potatoes are produced. Beans would doubtless yield well.

Goose Creek silty clay loam, heavy-subsoil phase.—The heavy-subsoil phase of Goose Creek silty clay loam is very inextensive. It differs greatly from typical Goose Creek silty clay loam, but, on account of its relative unimportance, it was not given a separate series designation. The surface soil is fairly friable light-brown or brown silt loam or silty clay loam, with a tendency to form clods. The upper part of the subsoil is brown rather tough silty clay loam or clay, which probably hinders the penetration of plant roots and the absorption of water to some extent. The subsoil, below a depth ranging from 2 to 3 feet, in most places consists of fairly friable light-brown material of medium texture. As a rule no lime car-

bonate is present within a depth of 6 feet. This soil is fairly level, lying in stream bottoms, but it is well drained and free from alkali in most places. A single small body in the extreme northeast corner of the area is rather strongly affected by alkali salts. A large part of this soil is under cultivation and produces alfalfa hay, wheat, and barley.

Goose Creek fine sandy loam.—Goose Creek fine sandy loam is similar to Goose Creek silty clay loam, but it has a lighter-textured surface soil and, in most places, a somewhat lighter subsoil. The texture of this soil ranges from loamy fine sand or fine sandy loam to loam. The soil is friable and in most places deep, though in a few small spots it overlies the lava within 6 feet of the surface.

This is a desirable agricultural soil, though it is not very extensive. It has about the same crop-producing value as Goose Creek silty clay loam.

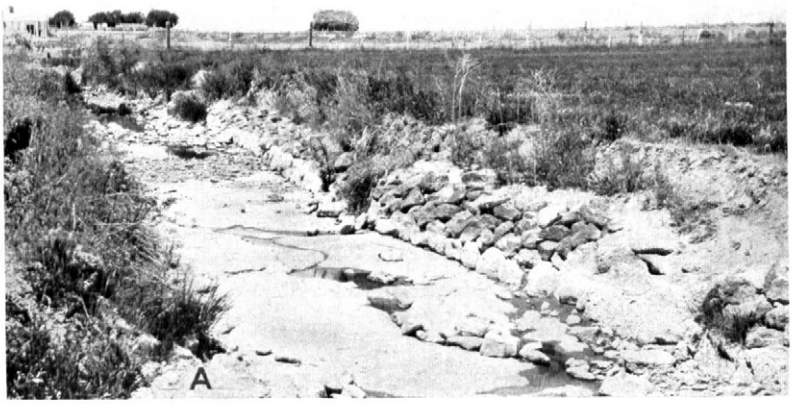
Goose Creek fine sandy loam, dark-colored phase.—Goose Creek fine sandy loam, dark-colored phase, includes small areas ranging in texture from loamy fine sand to fine-textured loam. The surface soil is dark grayish brown or nearly black and is mellow and friable. In many places this material extends to a depth of 6 feet, but in other places the material is considerably stratified with somewhat heavier or lighter textured layers or with dark-brown or black peaty or mucky layers. The lower part of the subsoil in many places is light gray and in some places is greenish gray. In general, very little lime carbonate occurs in the surface soil or subsoil.

Drainage is poor, and much of the land is boggy or marshy. It is used principally for pasture. Small areas have been artificially drained and are producing good crops of alfalfa and corn. Potatoes and truck crops would doubtless do well on this soil were drainage adequate.

LIGHT-TEXTURED SOILS

Included in the light-textured group are Portneuf fine sand and its shallow phase; Gooding sand; Winchester fine sand; Ephrata sandy loam and its noncalcareous-subsoil phase; and Ephrata loamy sand, with two phases. These soils have very light-textured and usually loose surface soils and subsoils which range from compact to very loose and open. In many places these soils are excessively drained, dry out quickly, and require frequent irrigation. Most of them are very low in content of organic matter, humus, and nitrogen. Much trouble is experienced in obtaining crop stands, as the surface soil dries out rapidly and blows badly. It is often difficult to apply irrigation water to the land without undue loss by percolation or excessive washing of fields and ditch banks.

The lighter or sandier types of soil are used extensively for the growing of alfalfa for both hay and seed, the two constituting the most important crops on these soils, not only because they yield well but because they do relatively better than most other crops, and because, once the land is in alfalfa, it is more easily and cheaply handled. The alfalfa forms a sod which prevents blowing of the surface soil and renders irrigation easier and less wasteful, and the plant also furnishes the humus and nitrogen so essential to the growth of other crops.



A, Shallow basaltic bedrock exposed in bottom of irrigation canal in Gooding silt loam. B, scab land area in Hagerman Valley

A, Potatoes on Portneuf loam, B, dairy cattle on alfalfa pasture on Gooding silt loam, deep phase

Corn and potatoes generally do well on these soils, especially following alfalfa. Red clover, grown for hay and seed, also does fairly well. Beans and the small grains, principally wheat and barley, are grown to some extent but do not return such good yields as on the finer-textured soils. Success with these crops depends largely on the presence of a finer-textured subsoil within reach of the feeding roots. Therefore they do better, as a rule, on Portneuf fine sand and Gooding sand than they do on the looser-subsoiled Ephrata and Winchester soils. In some localities watermelons and cantaloupes are important crops on these sandy soils, and in restricted areas, especially near Snake River, apples, apricots, cherries, peaches, and pears are grown.

Portneuf fine sand.—Portneuf fine sand is a fairly extensive and important soil in the Gooding area. It has a surface soil of light grayish-brown or dull grayish-brown fine or medium sand ranging from a few inches to 3 feet in thickness. This layer is underlain in many places, but not everywhere, by a slightly heavier more compact and slightly cloddy brown or reddish-brown layer. At an average depth of 2½ or 3 feet a somewhat compact very limy light-gray layer is present. The subsoil is in general somewhat finer textured than the surface soil, ranging from fine sandy loam or very fine sandy loam to loamy fine sand. Where the soil material is deep, the lower part of the subsoil is friable or loose fine sandy loam, very fine sandy loam, or loamy fine sand. Where bedrock comes within 6 feet of the surface, it is generally capped by a layer, a few feet thick, of fine-textured light-gray or white material which is more or less firmly cemented by lime (lime hardpan).

This soil is well or rather excessively drained. The subsoil in most places has fairly good water-holding capacity, but the surface soil dries out quickly and requires frequent irrigation.

Alfalfa is by far the most important crop grown. Probably three-fourths or more of the cultivated acreage is devoted to this crop. It produces from 2½ to 6 tons of hay an acre, with an average between 3 and 4 tons reported. The yield of alfalfa seed has ranged from 2 to 18 bushels an acre, with an average of about 6 bushels. Clover seed is not so commonly grown on this soil, and the yield probably averages slightly less than that of alfalfa. Corn does well and is reported to yield from 20 to 75 bushels an acre. Potatoes yield from 100 to 200 sacks, occasionally higher. Wheat yields from 10 to 40 bushels an acre, with an average of about 20 or 25 bushels, and barley slightly more. The depth to the finer subsoil seems to have much influence on grain yields, and much better yields are obtained after the land has been in alfalfa; but, generally speaking, this soil can not be considered so well adapted to the small grains as are the medium-textured soils. The same is true of beans. A few small orchards are located on this soil, and the trees are reported to yield well. Large areas are as yet uncultivated and are largely covered by sagebrush and rabbit brush.

Portneuf fine sand, shallow phase.—The shallow phase of Portneuf fine sand is more extensive than typical Portneuf fine sand. It includes 19,264 acres, most of which lies south and southwest of Wendell. The depth to bedrock averages less than 4 feet. Many very shallow spots and numerous rock outcrops are present. The

surface soil ranges from fine sand to medium sand, and the subsoil in most places is rather compact light-gray fine sandy loam which grades into a lime-carbonate hardpan overlying the bedrock. In some places the material composing this lower layer is but softly cemented and resembles fine silt or clay, some of which has a rosy-pink tinge.

Soil of this phase is similar to, and joins with, the rock-outcrop phase of Portneuf fine sand of the Jerome area.

The same crops grow on this soil as on the deeper Portneuf fine sand. Although it is more extensive than that soil, a large part of the land is as yet uncleared. Additional acreages are gradually being developed. The somewhat uneven relief, tendency to drifting by the wind, and difficulty of obtaining crop stands, hampers the development of this soil, but its adaptation to alfalfa, and especially to alfalfa seed, causes much demand, and eventually most of it may be brought under cultivation. It is a rather droughty soil and requires frequent irrigation. On account of the numerous very shallow spots and rock outcrops, yields are generally somewhat lower than on the deep Portneuf fine sand.

Gooding sand.—Gooding sand covers a fairly large acreage east and southeast of Gooding, and a few small bodies occur in other parts of the area. The soil mantle overlying the bedrock in most places is less than 4 feet deep, though a few deeper spots occur, and very shallow spots and rock outcrops are numerous. The surface soil is loose dull-brown or grayish-brown sand to a depth ranging from a few inches to 3 feet or, in a few places, deeper. It is underlain by a tough subsoil of rust-brown or reddish-brown heavy clay loam or clay, which in most places is practically free of lime carbonate. In places where the soil material exceeds 3 or 4 feet in depth, a light-gray compact limy layer is present and grades into a lime hardpan overlying the bedrock.

This soil lies mainly within the Big Wood River Canal Co. project and is largely under cultivation. However, lack of a sufficient water supply has prevented normal agricultural development. Alfalfa for hay has been the most important crop, occupying about one-half the total area, with wheat and barley next in importance. Red clover for seed and hay has been grown to some extent, and a small acreage is devoted to pasture. Alfalfa is reported to yield from 1 to 5 tons an acre, depending largely on the water supply; wheat, from 10 to 50 bushels, with an average of about 30 bushels; and barley, slightly more than wheat. That the small grains yield as well as they do is probably owing to the fact that the subsoil is heavy and retains moisture well. Clover seed yields an average of about 5 or 6 bushels an acre. Corn and potatoes may become important crops when a better water supply is available. The surface soil dries out rather quickly and blows badly when the plowed ground is exposed to the strong winds of the region.

Winchester fine sand.—Winchester fine sand occurs in a number of rather small scattered bodies. It consists of deep loose light-brown fine sand from the surface down to bedrock or to a limy layer like that of the Portneuf subsoils. In most places the depth to bedrock is more than 6 feet, though in some places it is less. The relief is, in general, hummocky or almost duny. Only a small pro-

portion of the land is under cultivation. This is not a desirable soil, because of its looseness, tendency to blow, and high water requirement. Most of the land under cultivation is devoted to alfalfa for hay and seed.

Ephrata loamy sand.—Ephrata loamy sand occupies fair-sized areas of terrace land along Snake River, Big Wood River, and Dry Creek. The surface soil is dull-brown or light grayish-brown loose or fairly firm medium sand or loamy sand. A slightly more compact and heavier subsurface layer is present in many places, but not everywhere. In most places, at a depth ranging from 1½ to 3 feet, there is a light-gray limy layer consisting of loamy sand, sand, or gravel, which in some places is softly cemented. This layer, in turn, is underlain at a depth ranging from 3 to 4 feet by a loose bed of sand or gravel.

Most areas of this soil are well drained, but a few small areas east and southeast of Hagerman, which are underlain by comparatively impervious lake-deposited clays, have a high water table and are marshy in spots, probably partly because of too heavy irrigation.

Alfalfa hay is the most important crop on this soil, and tame pasture grasses also occupy an important acreage. The small grains (wheat, barley, and oats) are grown to some extent, but the yields are not high. Corn, grown for grain and silage, gives good yields. Watermelons and cantaloupes are of some importance, and potatoes do well, though they are not extensively grown. A number of small home orchards and vineyards are set out on this soil. They yield well and produce a good quality of apples, peaches, pears, apricots, cherries, and grapes.

Ephrata loamy sand, poorly drained phase.—The poorly drained phase of Ephrata loamy sand occurs in a few small low-lying areas which are thoroughly water-logged, boggy, and marshy. The color of this soil has been modified by poor drainage and is gray or dark gray. The only use made of the land is for pasture.

Ephrata loamy sand, stony phase.—The stony phase of Ephrata loamy sand consists very largely of a mass of rounded black basalt bowlders, with the finer material similar to Ephrata loamy sand or Ephrata sandy loam. In some places the bowlders were mainly on the surface, and in a few such places they have been cleared from the land, and the soil is mapped as Ephrata loamy sand or Ephrata sandy loam. The bowlders range from a few inches to more than 6 feet in diameter.

A part of the land is irrigated and produces tame pasture; the remainder affords scant natural grazing.

Ephrata sandy loam.—Ephrata sandy loam is much like Ephrata loamy sand, but it is slightly heavier and firmer. The limy subsoil layer is normally well developed, but in a few places it is not present.

This soil is similar in crop adaptations to Ephrata loamy sand. Alfalfa hay is the most important crop. Corn and melons do well, and a number of orchards are producing good crops of apples, cherries, pears, and apricots. The small grains are grown to some extent, and they give somewhat better yields than on the loamy sand. A large proportion of this soil is devoted to tame pasture.

Ephrata sandy loam, noncalcareous-subsoil phase.—The noncalcareous-subsoil phase of Ephrata sandy loam is similar to typical

Ephrata sandy loam, but it does not have the gray lime layer in the subsoil. The soil is shallow, normally less than 2 feet thick, and it is underlain by a bed of loose coarse black sand or gravel. It is like Rupert sandy loam of the Minidoka area, Idaho.[6] Very little of this soil is under cultivation. Under irrigation it is similar in its crop-producing value to typical Ephrata sandy loam, but, being somewhat shallower and looser, it requires more frequent irrigation. The total extent of this soil is very small.

MISCELLANEOUS CLASSES OF LAND

The classes of miscellaneous materials mapped in this area are scab land, rough broken land, and rough stony land. They are considered as having little or no value as agricultural land, though in some places they have some value for grazing land or as sites for farmsteads and buildings.

Scab land.—Scab land consists of land areas which contain so large a quantity of rock outcrop that the land is unsuitable for farming under irrigation. Small patches of tillable land are included, but they are too small and too isolated to be economically irrigated and farmed. Scab land furnishes a small amount of spring and winter grazing. (Pl. 1, B.)

Rough broken land.—Rough broken land consists largely of bluffs and hilly lands, too rough or steep to be farmed but fairly free from outcropping rock or loose stone. It has some value as grazing land, and a part of it might possibly, under some circumstances, be used in the production of grapes or some of the tree fruits.

Rough stony land.—Rough stony land consists of the rock cliffs and steep stony talus slopes which compose the canyon walls of Snake River and several of its tributary streams. It is of no agricultural value and of little or no value for grazing.

IRRIGATION, DRAINAGE, AND ALKALI

Irrigation is necessary for the successful growth of crops in the Gooding area. Two large irrigation projects—the Twin Falls Northside Canal Co. project and the Big Wood River Canal Co. project—are supplying water to the greater part of the cultivated land, and several thousand additional acres are irrigated by old water rights on Big Wood and Little Wood Rivers and from large springs and spring-fed streams along Snake River, particularly in the Hagerman Valley.

The Hagerman Valley ranches have an abundance of water at all times. The lands on the Twin Falls Northside project have had an insufficient water supply during many seasons in the past, but in the last three seasons (1927, 1928, and 1929) the supply has been increased, and the enlargement of the distributing laterals now in progress will further augment water delivery. The building of the American Falls Reservoir, which was completed in 1926, insures a dependable water supply which appears, in general, sufficient for satisfactory crop production on most of the land of the area, though

[6] YOUNGS, F. O., BALDWIN, M., KERN, A. J., and MCDOLE, G. R. SOIL SURVEY OF THE MINIDOKA AREA, IDAHO. U. S. Dept. Agr., Bur. Chem. and Soils, Ser. 1923, Rpt. 27. [859]-902, illus. 1928.

many of the farmers believe the supply should be increased. Lands on the Big Wood River project have suffered even more from seasons of scanty water supply. This condition will soon be relieved by the completion of the Gooding Canal, now under construction by the United States Bureau of Reclamation, which will divert water from Snake River at Milner Dam.

The surface relief of the land in this area is, in general, gently rolling, and this has led to the use of the furrow, or corrugation, method of irrigation. The lands are, as a rule, not level enough to make irrigation by flooding practical. Each farm has a continuous run of water. This gives a very small head of water on small landholdings and a rotation system, using a larger head of water, might be used to greater advantage in many places, especially on the sandier soils.

The texture and depth of the soil have a marked effect on the water requirement of lands in this area. The sandier soils, such as the sands, fine sands, loamy sands, and loamy fine sands, absorb moisture very readily, so quickly in fact that it is difficult to irrigate fields evenly. In many places, if the lower ends of the furrows get sufficient water there is a large loss by percolation from the upper ends. The distribution of water is governed also to a large extent by the character of the subsoil. Much more water is usually lost by percolation in the Ephrata soils than in those of the Portneuf series, and less is lost in this manner in the soils of the Gooding and Sagemoor series. The problem with the heavier-textured members of the Gooding and Sagemoor series is to obtain sufficient penetration of moisture into the heavier, denser subsoils. The sandier soils, of course, dry out more quickly than the finer-textured ones.

Thus it is evident that the method of irrigation should be varied, in order to make the most efficient use of water on the different soils and to obtain the best results with the crops grown. In general, the sandier and shallower soils should receive more frequent but lighter applications of water than the finer-textured and deeper soils, which have a greater capacity for holding moisture. When the soil becomes saturated to bedrock or to the loose sand and gravel substratum, any further application of water is not only wasteful but an actual detriment to growing crops. On the looser sandy soils the furrows, or runs, of water should be short, and a sufficient head should be used to run quickly through the furrows. Of course caution is necessary to avoid the use of such a large stream as to cause serious washing of the land. When the water has reached the lower end of the furrow the head should be cut down and the water allowed to run until the soil becomes sufficiently moist. In irrigating the finer-textured soils a smaller head of water should be used, it should be allowed to run for a longer time, and a thorough irrigation will be sufficient for a comparatively long period. Proper irrigation of a field is often rendered difficult by variation of texture and depth of soil within that field.

Drainage is not an important consideration over most of the Gooding area. The upland plain is nearly everywhere well drained, although numerous small depressions occur. The substratum of porous rock carries away ground water, preventing the rise of the water table. In the Hagerman Valley a few small areas of high terrace lands have a high water table, owing to heavy irrigation and

a rather dense, impervious clay substratum. This condition has, in small spots, caused the killing out of alfalfa and other desirable crops. Foxtail, sedges, and, in some places, salt grass have sprung up in such spots. The condition has been improved in places by the installation of tile or open drains and by cutting down the quantity of water applied. Lower-lying lands along some of the spring-fed creeks are boggy or marshy. The larger areas of such land are included in bodies of Goose Creek fine sandy loam, dark-colored phase, and in the poorly drained phase of Ephrata loamy sand.

A number of tests were made for alkali salts within the area. Only a few of the poorly drained spots showed an appreciable concentration of alkali, and these were not of sufficient extent or importance to be shown on the soil map. It is thought that where drainage is provided the slight excess of alkali salts may be rather easily washed from these spots.

SOILS AND THEIR INTERPRETATION

The soil materials from which the soils of the Gooding area have developed are of comparatively recent accumulation, geologically, but have lain in place long enough to form very definite soil and profile characteristics. (This statement does not apply to small areas of recent alluvium and wind-blown sand.) They consist largely of wind-laid or water-laid deposits superimposed over lava beds or over the fine-textured deposits of an ancient lake. Very small areas of soil are residual from the weathering of these two older formations.

Most of the soils have developed on an upland plain which is, and apparently has long been, well drained. It is possible that the valley of Big Wood and Little Wood Rivers, in the neighborhood of Gooding, was at one time a poorly drained basin or even a lake bed. Certain soil features tend to suggest that the soil materials of the soils of the Gooding series may have been deposited in still water or that the soils have developed under poor drainage. Most of the rather extensive stream terraces along Snake River are high and well drained. Only small flats of comparatively recent alluvial material are poorly drained.

The soils of the area have developed under a temperate climate and low rainfall, and they exhibit a number of characteristics common to the soils of the arid sections of the northwest intermountain country. The color of the soils is normally light, ranging from very light grayish brown to dull brown. The content of organic matter is low, but the content of minerals, including lime carbonate and compounds of potash and phosphorus, is comparatively high. In short, these soils are poor in nitrogen but rich in the mineral plant foods. All the more mature soils, if there is sufficient depth of soil material, have a gray compact subsoil layer which is very high in lime, magnesium, and other associated minerals. Water-soluble salts are not normally present in quantities harmful to vegetation.

The soils are all distinctly alkaline in reaction rather than acid or neutral. This is shown by pH determinations made in the laboratory of the Bureau of Chemistry and Soils on samples of Port-

neuf fine sandy loam, Gooding silt loam, and Gooding sand. In Gooding silt loam the surface soil and upper subsoil layer are only slightly alkaline, whereas the lower-lying subsoil layers are distinctly so. Gooding sand, which is shallow, is uniformly only slightly alkaline. Portneuf fine sandy loam is distinctly alkaline from the surface down, though the limy subsoil shows slightly greater alkalinity. Table 3 shows the results of pH determinations for three soils of the Gooding area. These results were obtained by the hydrogen-electrode method.

TABLE 3.—*pH determinations of soils in the Gooding area, Idaho*

[1½ cc soil, 1 2 soil-water ratio]

Sample No	Soil type	Depth	pH	Sample No	Soil type	Depth	pH
		Inches				*Inches*	
541451	Portneuf fine sandy loam	0–8	8. 52	541440	Gooding silt loam	11–28	7 98
541452	do	8–18	8 35	541441	do	28–52	8 33
541453	do	18–31	8 60	541442	do	52+	8. 20
541454	do	31–42	8 62	541430	Gooding sand	0–6	7 39
541455	do	42–54	8 55	541431	do	6–11	7 43
541438	Gooding silt loam	0–6	7 22	541432	do	11–23	7 05
541439	do	6–11	7. 33				

No chemical analyses of the soils of the Gooding area are available. However, the finer-textured Portneuf soils, including the fine sandy loam, very fine sandy loam, and loam, are very similar in apparent physical and chemical properties to Portneuf silt loam which occurs extensively in the Twin Falls area. Chemical analyses were made of a number of samples of this and of similar soils in the Twin Falls area by the Bureau of Soils, United States Department of Agriculture, and by the Department of Agricultural Chemistry, University of Idaho. As may be seen by consulting Table 4, showing the chemical composition of Portneuf silt loam, that soil is rich in lime (CaO), potash (K_2O), and phosphoric acid (P_2O_5), but low in nitrogen (N).

TABLE 4.—*Chemical analyses of Portneuf silt loam from the Twin Falls area, Idaho*[1]

Sample No	Depth	SiO_2	TiO_2	Fe_2O_3	Al_2O_3	MnO	CaO	MgO	K_2O
	Inches	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
540901	0–3	72 44	0 64	3 92	12. 16	0. 06	2 04	1 47	2. 57
540902	3–14	68 69	65	4 30	12. 91	05	2 73	1 75	2. 42
540903	14–36	58. 06	.49	3 10	9. 67	.05	10 80	3 41	1 98

Sample No.	Na_2O	P_2O_5	SO_3	Ignition loss	Total	N	CO_2 from carbonates	H_2O at 110° C.
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
540901	1 77	0 17	0 13	3 63	101 00	0 07	0	2 05
540902	2 01	20	08	4 85	100 64	08	0	3 20
540903	1 80	18	20	11 30	101 04	.03	8 42	2 10

[1] Analyses by G J Hough.

The range of textures is from medium sand to silty clay loam. Differences in soil profile correspond with differences in texture of the soil material. Generally speaking, the lighter textured the soil the deeper the surface soil and the less compact the limy subsoil layer. Again, where the texture is coarse there seems to be more of a tendency to the formation of a comparatively compact and heavier subsurface layer, free from lime carbonate and having a stronger or more reddish-brown color than the surface layer.

The Portneuf series is the most extensive and characteristic soil series of this area as well as of other areas previously mapped in southern Idaho. In the Gooding area, the most extensive and important type in this series is the fine sandy loam, with its four phases. This soil shows the general profile characteristics of the soils of the series as mapped in other areas. A study of the profile of this soil, of which samples were taken in a cut where the surface soil had apparently not been disturbed, on an undulating upland plain southeast of Wendell, follows:

The surface soil to a depth of 8 inches is friable or slightly compact light-brown fine sandy loam having a rather indistinct columnar structure. This material when treated with dilute hydrochloric acid produces no effervescence, indicating that it does not contain appreciable quantities of the carbonates of lime, magnesium, and other related chemical elements. This layer breaks off rather sharply, giving place to somewhat compact light grayish-brown highly calcareous fine sandy loam which contains a few small rather soft lime-cemented nodules. This layer, extending to about 18 inches below the surface, grades into compact light-gray or light brownish-gray material (fine sandy loam or very fine sandy loam) which is softly cemented by lime and has a nodular structure. The soil material in this layer is rather hard or tough when dry but soft and easily penetrated when moist. At a depth of about 31 inches the soil becomes soft and friable but contains a few harder nodules. It is light grayish brown or brownish gray and is highly calcareous. In many places material of this character extends to a depth of 6 feet or much deeper, but in many places, as in the particular section studied, it is underlain by rather compact or softly cemented mottled light-gray and pinkish-brown material. The texture of this material is very different from that of the soil above and is probably heavy sandy loam or loam. It contains much medium or coarse sand consisting of quartz and other light-colored sands. It seems probable that it is of different geologic origin from the more uniformly textured material above it. This layer somewhat resembles the subsoils of the Gooding soils. At a depth of about 54 inches the material becomes more firmly cemented, forming a mottled gray and pinkish-brown lime-carbonate hardpan which consists of hard, thin plates, together with a small quantity of finer or softer interstitial material. The thickness of the hardpan was not determined in this locality, but it ranges from a few inches to 3 feet, or in a few places more. It forms a capping over the basalt bedrock and in many places contains fragments or small bowlders of basalt.

Portneuf very fine sandy loam and Portneuf loamy fine sand, save for a slight difference in the texture of the surface soil, are very similar to the soil just described. The shallow phases of the Portneuf soils differ in that the hardpan or the compact heavy layer

lying above it generally lies within 3 feet of the surface, and the friable layer, the C horizon, which occurs beneath the layer of lime concentration in the deeper soils, is not present.

Portneuf loam, which is a minor soil type in the Gooding area, is not typical of the Portneuf series. In most places, the subsurface layer is somewhat heavier in texture and of more compact and cloddy structure than the surface soil. This layer does not contain an appreciable quantity of lime carbonate. The lime layer generally begins at a depth of about 15 or 18 inches and is like that described in connection with Portneuf fine sandy loam, though it is generally somewhat tougher or more firmly cemented. In most places the friable C horizon or soft unmodified material beneath the limy layer in the Portneuf soils is not present, but in its place is a rather compact and softly cemented mottled light-gray and pinkish-brown material which extends beyond a depth of 6 feet. This soil may be considered to tend slightly toward soils of the Gooding series.

Portneuf fine sand has a loose surface soil of fine sand or medium sand, a slightly or moderately compact subsurface layer of somewhat loamier material extending to a depth ranging from 2 to 3 feet, and a rather compact limy subsoil layer, commonly underlain by softer, more friable material.

The soils of the Minidoka series are similar in profile to those of the Portneuf series, but they have a more extreme development of lime concentration in the subsoil. Samples of typical Minidoka loamy fine sand, the only representative of the Minidoka series mapped in the Gooding area, were taken in a deep railroad cut, in a rolling or ridgy upland. They show the following profile:

The surface soil, which extends to a depth of 14 inches, is friable light-brown loamy fine sand. It shows little distinct structure, though the lower part is slightly more compact and cloddy than the topmost part of the surface soil. For the most part the material is not calcareous but contains a few scattered small lime-hardpan fragments and a very few waterworn gravel. Between depths of 14 and 26 inches is light brownish-gray or pinkish-gray material which is very highly calcareous, softly cemented, and nodular in structure. The texture is probably fine sandy loam. This material overlies a light-gray, pinkish-gray, or pink and white lime-carbonate hardpan which consists of thin hard plates, between the layers of which is a small quantity of fine pinkish-gray interstitial material. This hardpan layer extends to a depth of about 60 inches and overlies a somewhat softer, though noticeably cemented, light pinkish-gray or brownish-gray fine-textured material. A porous bed of gravel occurs at a depth of about 10 feet.

This description is fairly typical of Minidoka loamy fine sand as mapped in the Gooding area, though the texture of the surface soil is perhaps slightly coarser than the average soil mapped elsewhere. The character of the substratum also varies. The gravel beds occur at depths ranging from 3 to 15 feet below the surface. Small areas occur, which are not underlain by gravel but have a substratum of compact gray fine-textured old-lake sediments.

In the origin of the soil material this soil very possibly differs from the Minidoka soils mapped in the Minidoka and Jerome

areas. In those areas the soil was apparently developed on a wind-laid deposit over basalt bedrock. Here, it is probably, in part at least, alluvial in origin and overlies a water-laid substratum.

The soils of the Gooding series are very distinct and different from any of the other soils mapped in the Gooding area or in other areas in southern Idaho. They are characterized by a heavy tough upper subsoil layer, which is generally free from lime carbonate, and by the greater depth to the underlying horizon of lime accumulation.

A study was made of a Gooding silt loam profile, which brings out the characteristics of the series. A pit was dug in virgin sagebrush land on the gently rolling plain northeast of Gooding, and the following observations were made:

The first 6 inches of soil is soft friable very light grayish-brown or light brownish-gray silt loam or very fine sandy loam, which forms fragile clods having a marked vesicular structure. This is the only soil type in the Gooding area, which shows a distinct surface layer of this character. From 6 to 11 inches the soil material is rather compact and cloddy dull-brown or grayish-brown silt loam or silty clay loam, and from 11 to 28 inches it is strong brown or slightly reddish brown very compact clay. The clay layer has a prismatic structure, in which the prisms average slightly less than one-half inch in diameter. They break into small angular clods. This material is free from lime carbonate. At a depth of 28 inches the character of the soil changes. The color becomes light pinkish brown mottled with gray, and the material is highly calcareous and has a fine nut or buckshot structure. A gray firm hardpan, which apparently consists of clay cemented by lime, is reached at a depth of 52 inches.

Gooding loam and Gooding sandy loam are similar to Gooding silt loam in profile. They have friable surface soils but lack the very light colored soft vesicular clods which commonly occur in the surface soil of the silt loam. In the profile of Gooding loam studied, the subsoil layer, between depths of 30 and 37 inches, contained light-gray flecks and mottlings, but these have proved to be not lime but amorphous silica. No lime is present above the lime hardpan which lies at a depth of 37 inches below the surface.

Table 5 gives the results of mechanical analyses of samples of the surface soil, subsurface soil, and several layers of the subsoil of Gooding loam. These samples were taken 1⅝ miles north of Gooding.

TABLE 5.—*Mechanical analyses of Gooding loam*

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
541433	Surface soil, 0 to 6 inches	5 1	8.6	5.2	11 7	12.5	38.9	17.9
541434	Subsurface soil, 6 to 17 inches	3 7	8.9	5 4	12.0	11 8	36 2	22.0
541435	Subsoil, 17 to 30 inches	3 5	6 8	4 3	9 1	11 7	36 0	28.6
541436	Subsoil, 30 to 37 inches	1	3	3	1 7	13 1	55 1	29 5
541437	Subsoil, 37+ inches	12 0	15.5	6.7	9 3	13 0	31 7	11 7

The profile of Gooding sand is similar to that of the other members of the Gooding series, but there is a more marked contrast between surface soil and subsoil. The surface soil is loose sand, and the subsoil is tough heavy clay loam or clay. No lime occurs above the bedrock in the profile of this soil studied, but in places there is a gray lime layer below a depth ranging from 3 to 4 feet.

The results of mechanical analyses of samples of the surface soil, subsurface soil, and subsoil of Gooding sand are given in Table 6. These samples were taken 3¼ miles east of Gooding.

TABLE 6.—*Mechanical analyses of Gooding sand*

No	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
541430	Surface soil, 0 to 6 inches	2.6	10.4	17.4	34.9	16.1	11.9	6.6
541431	Subsurface soil, 6 to 11 inches	2.4	10.6	18.3	35.7	15.3	10.7	7.2
541432	Subsoil, 11 to 23 inches	1.7	5.1	7.6	15.2	13.4	25.4	31.6

The Ephrata soils have general profile characteristics much like those of the Portneuf soils, but the surface soil material and more particularly the deeper part of the subsoil, or substratum, are different in character and origin. These soils normally occupy well-drained alluvial terraces.

A profile of Ephrata sandy loam in an open pit was studied and showed the following characteristics: The surface soil to a depth of 4 inches is rather loose light-brown or brown loamy sand containing much coarse basaltic grit. Beneath this is rather compact light-brown or light reddish-brown sandy loam, with a fairly distinct columnar structure. At a depth of about 22 inches and extending to a depth of 48 inches is slightly compact light-gray or light brownish-gray sandy loam which is very highly calcareous and contains more or less vertical streaks of slightly cemented material, the cementation being caused by infiltration of lime. The substratum consists of loose dark-gray or black coarse basaltic sand.

Ephrata loamy sand is much like Ephrata sandy loam, but it is somewhat lighter textured and looser.

McCammon sandy loam is a shallow rust-brown soil, residual from the underlying basalt. It commonly has no well-marked horizons, though in a few of the deeper spots it has a thin gray lime layer overlying the rock.

Sagemoor silty clay loam is residual from compact old-lake sediments of fine texture and light-gray color. The surface soil is slightly calcareous and the subsoil highly so. Some lime infiltration has taken place in the vertical cracks or seams and in the horizontal planes between the laminated clay layers.

The Goose Creek soils and the alluvial phase of Portneuf fine sandy loam are composed of recent alluvium and are fairly uniform and little modified in profile. The Goose Creek soils probably have a somewhat greater organic-matter content than most of the other soils of the area. They contain little or no lime carbonate within a depth of 6 feet. The alluvial phase of Portneuf fine sandy loam

is somewhat lighter in color and commonly contains a moderate quantity of lime carbonate in both surface soil and subsoil.

The dark-colored phase of Goose Creek fine sandy loam is a recent alluvial soil, but it has been formed under conditions of poor drainage, which have given it distinct characteristics. The soil is dark grayish brown or black and in many places contains peaty or mucky layers. Much of the subsoil is light gray with a slight green tinge.

The poorly drained phase of Ephrata loamy sand is gray or dark gray, owing, doubtless, to the poor condition of drainage under which it exists.

Results of determinations of the moisture equivalents of the soils mapped in the Gooding area are given in Table 7. These determinations were made in the laboratories of the University of Idaho. These figures represent a laboratory determination which closely approximates the field moisture capacity of the medium-textured soils. The results for the sands are probably somewhat lower than the field moisture capacity but still give a good idea of the relative moisture-holding capacity. Soils with moisture equivalents of 10 to 25 (sandy loams, silt loams, or silty clay loams) ordinarily handle well under irrigation, whereas those with lower moisture equivalents tend to be droughty, particularly if the subsoil is not composed of finer material. Where the subsoil has a high moisture equivalent, restricted drainage may be suspected, for example, Goose Creek fine sandy loam, dark-colored phase, and Sagemoor silty clay loam.

TABLE 7.—*Moisture equivalent determinations of soils in the Gooding area, Idaho*

Sample No.	Soil type	Location	Depth	Moisture equivalent
			Inches	*Per cent*
541401	Ephrata sandy loam	4 miles northwest of Ticeska	0- 4	7 9
541402	do	do	4-22	10 0
541403	do	do	22-48	6 6
541404	do	do	48-72	2 8
541405	Portneuf fine sandy loam, alluvial phase	4½ miles northwest of Ticeska	0- 8	22.0
541406	do	do	8-32	20 7
541407	do	do	32-72	18 4
541408	McCammon sandy loam	4½ miles northwest of Bliss	0- 6	14 8
541409	do	do	6-14	14 9
541410	do	do	14-22	11 6
541411	Minidoka loamy fine sand	1 mile west of Bliss, just north of railroad	0-14	9 5
541412	do	do	14-26	21 1
541413	do	do	26-60	21 3
541414	do	do	60-72	22 5
541415	Portneuf very fine sandy loam	1½ miles southeast of Bliss	0-11	16 4
541416	do	do	11-32	16 7
541417	do	do	32-72	10 9
541418	Goose Creek fine sandy loam, dark-colored phase	1½ miles south of Bliss	0-15	13 5
541419	do	do	15-50	33 8
541420	do	do	50-72	17 3
541421	Sagemoor silty clay loam	¼ mile south of Hagerman	0-12	19 6
541422	do	do	12-72	35 0
541423	Goose Creek silty clay loam	¾ mile south of Gooding	0- 8	19 6
541424	do	do	8-30	24 7
541425	do	do	30-72	27 0
541426	Portneuf loam	2 miles south of Gooding	0- 8	19 3
541427	do	do	8-17	20 9
541428	do	do	17-36	23 6
541429	do	do	36-72	23 2
541430	Gooding sand	3¼ miles east of Gooding	0- 6	6 9
541431	do	do	6-11	7 1
541432	do	do	11-23	17 9
541433	Gooding loam	1⅝ miles north of Gooding	0- 6	16 6
541434	do	do	6-17	17 5
541435	do	do	17-30	23 3

TABLE 7.—*Moisture equivalent determinations of soils in the Gooding area, Idaho*—Continued

Sample No.	Soil type	Location	Depth	Moisture equivalent
			Inches	*Per cent*
541436	Gooding loam	1⅛ miles north of Gooding	30-37	28 0
541437	do	do	37+	20 8
541438	Gooding silt loam	4½ miles northeast of Gooding	0- 6	19 9
541439	do	do	6-11	20 4
541440	do	do	11-28	33 7
541441	do	do	28-52	31 0
541442	do	do	52+	25.5
541443	Portneuf fine sand	4 miles southeast of Wendell	0- 6	5 4
541444	do	do	6-16	6 2
541445	do	do	16-36	9 6
541446	do	do	36-50	17 1
541447	do	do	50-60	15 7
541448	do	do	60-72	13 4
541449	Winchester fine sand	4½ miles southeast of Wendell	0-12	3 0
541450	do	do	12-72	3 0
541451	Portneuf fine sandy loam	2 miles southeast of Wendell	0- 8	11 5
541452	do	do	8-18	18 1
541453	do	do	18-31	16 5
541454	do	do	31-42	12 6
541455	do	do	42-54	25 2
541456	do	do	54+	18.9
541457	Portneuf loamy fine sand	1 mile southwest of Tuttle	0- 6	12.4
541458	do	do	6-15	15.8
541459	do	do	15-32	14.1
541460	do	do	32-54	11 4
541461	do	do	54-66	22.3
541462	Ephrata loamy sand	1¼ miles southeast of Hagerman	0- 9	4.9
541463	do	do	9-24	11.7
541464	do	do	24-32	4.6
541465	do	do	32-72	2 3
541466	Goose Creek fine sandy loam	2 miles east of Gooding	0- 8	19 2
541467	do	do	8-48	19 2
541468	Gooding sandy loam	2½ miles northwest of Gooding	0- 7	10 4
541469	do	do	7-26	18.8
541470	do	do	26-36	30 1
541471	do	do	36+	23 4

SUMMARY

The Gooding area lies on the Snake River plains of southern Idaho in Gooding and Elmore Counties. It comprises an area of 434 square miles, or 277,760 acres, and consists largely of a gently rolling plain broken by large comparatively recent lava flows which have a very uneven broken ridgy, or wavelike, surface. Snake River has cut a narrow valley, or canyon, along the south and southwest edge of the area.

Gooding is the principal town and county seat. Other towns within the area are Wendell, Hagerman, Bliss, and Tuttle.

The area is served by the main line and the Rupert-Bliss cut-off of the Oregon Short Line Railroad.

The climate is arid, with low annual rainfall, dry atmosphere, and a high percentage of sunny days. The summers are hot and the winters cold. The frost-free season at Gooding averages 119 days.

The greater part of the agricultural development has occurred within the last 20 years. About 80,000 acres were under cultivation in 1929, and the cultivated area is gradually being extended.

Alfalfa is the most important crop. It produces good yields of hay and seed and occupies an important place in the crop rotation for the maintenance of soil fertility.

Wheat and barley are extensively grown, and yields of these grains range, according to soil and moisture conditions, from poor to good. A rather large area is devoted to tame pasture. Beans and potatoes are cash crops of increasing importance. Red clover for seed and hay, corn for grain and silage, oats, and alsike and white clover seeds are crops of some importance, which are well adapted to the climate and soils of the area. Orchard fruits produce well in parts of the area but are not an important crop commercially.

The feeding of range sheep and cattle, dairying, and the raising of sheep, hogs, and poultry (especially turkeys) are important industries.

The soils of the area range in texture from sand to silty clay loam. There is also great variation in the depth of the soil mantle over the bedrock or hardpan. The sandier soils are especially adapted to the growing of alfalfa for hay and seed, also to corn and potatoes. The finer-textured soils are better for wheat, barley, and beans, and they give good results with all the other crops commonly grown in the area, with the possible exception of alfalfa seed.

Portneuf fine sandy loam is the most important agricultural soil. It is well adapted to all the common crops of the area. Portneuf very fine sandy loam, Portneuf loamy fine sand, and Portneuf loam are soils much like Portneuf fine sandy loam but are of less extent. The shallow phases of these soils are similar to the deeper soils, but on account of the thinness of the soil they dry out more quickly and generally give somewhat lower crop yields. Portneuf fine sand and its shallow phase cover a large extent of country. They are especially adapted to alfalfa hay and alfalfa seed. Small grains do not yield so well on these soils as on the heavier soils.

Minidoka loamy fine sand has a well-developed lime-carbonate hardpan. It is not an important agricultural soil.

Gooding silt loam, with its deep phase, Gooding loam, and Gooding sandy loam are good general-farming soils. Gooding sand has a tough, heavy subsoil. It has been a good producer of alfalfa hay, and the small grains do fairly well.

Ephrata loamy sand and Ephrata sandy loam are good alfalfa soils. Corn and melons also do well on these soils.

Goose Creek silty clay loam and Goose Creek fine sandy loam are deep, fertile soils, well suited to the growing of most of the crops common to this region.

Irrigation is necessary for the successful growing of farm crops. The water requirement of the different soils varies greatly. The sandier and shallower soils need more frequent but lighter irrigations.

Most of the land in the Gooding area is well drained. Only a few small areas near Snake River are poorly drained, and in only a few of the poorly drained spots are there any harmful accumulations of alkali salts.

○

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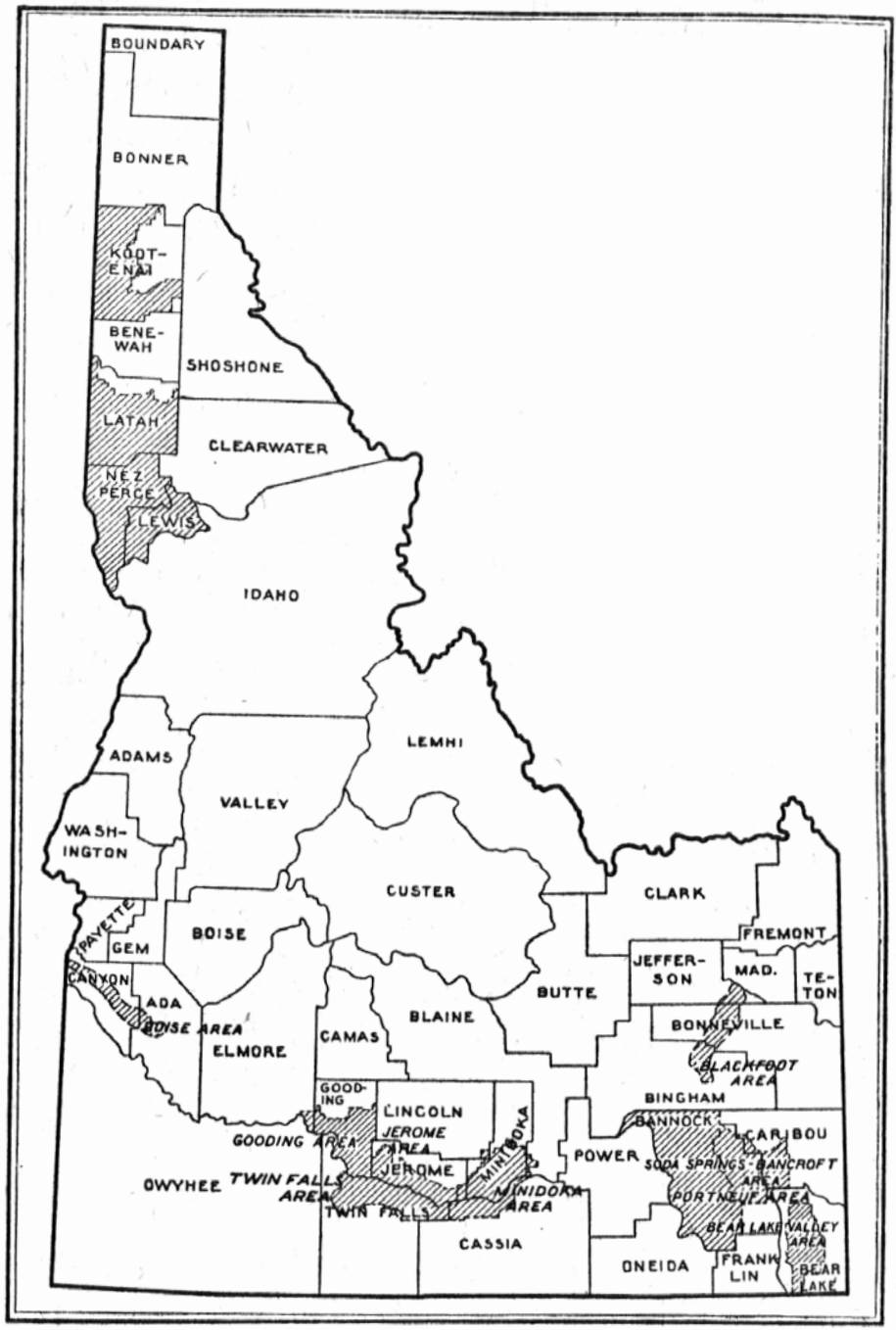

Areas surveyed in Idaho, shown by shading. Detailed surveys shown by northeast-southwest hatchings

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SOIL MAP
GOODING AREA
IDAHO

UNIVERSITY OF IDAHO
COLLEGE OF AGRICULTURE AND
AGRICULTURAL EXPERIMENT STATION
E. J. IDDINGS, DEAN AND DIRECTOR
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R. 11 E. | R. 12 E. | R. 13 E. | R. 14 E. | R. 15 E. | R. 16 E.

T. 4 S. | T. 5 S. | T. 6 S. | T. 7 S. | T. 8 S. | T. 9 S.

LEGEND

Ephrata loamy sand — El	Goose Creek fine sandy loam — Gf	Portneuf fine sandy loam — Pf
El — Poorly drained phase	Gf — Dark-colored phase	Pf — Shallow phase
	Goose Creek silty clay loam — Gy	Pf — Alluvial phase
El — Stony phase		
Ephrata sandy loam — Es	Gy — Heavy-subsoil phase	Pf — Steep phase
	McCammon sandy loam — Ml	Pf — Terrace phase
Es — Noncalcareous-subsoil phase		
	Minidoka loamy fine sand — My	Portneuf very fine sandy loam — Pv
Gs		
	Portneuf fine sand — Pd	Portneuf loam — Pm
Gm		
Gooding loam — Gl	Pd — Shallow phase	Sagemoor silty clay loam — Ss
Gooding silt loam — Go	Portneuf loamy fine sand — Po	Ss — Light-textured phase
		Winchester fine sand — Ws
Go — Deep phase	Po — Shallow phase	
	Scab land — S	Rough broken land — Rb
Go — Stony phase		
	Rough stony land — Rs	

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort.
- Secondary roads and Trails
- Railroads, Steam and Electric
- Bridges, Ferry
- R.R. crossings, Tunnel
- Ford, Dam
- School or Church, Cemeteries
- Mine or Quarry, Mine dumps, Made land
- Bluff, Escarpment, Rock outcrop and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- Boundary lines
- Boundary lines
- Boundary lines
- U.S. township and section lines

RELIEF
(Printed in brown or black)

- Contours, Depression contours
- Prominent Hills, Mountain Peaks
- Sand, Wash, and Sand dunes
- Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Springs, Canals and Ditches, Flumes
- Swamp, Salt marshes
- Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.

Macy H. Lapham, Inspector, District 5.
Soils surveyed by F. O. Youngs, U. S. Department of Agriculture, in charge, and Glenn Trail and B. L. Young, University of Idaho.

1 ½ 0 1 2 3 4 Miles
Scale 1 inch = 1 mile

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Field Operations
Bureau of Chemistry and Soils
1929